# CLAIMS

1. A primary battery, comprising:
   a cathode;
   an anode having a first medium including a first active material and a second medium having a concentration gradient of a second active material; and
   an electrolytic solution in contact with the cathode and the anode.

2. The battery of claim **1**, wherein the first medium is positioned so as to protect at least a portion of the second medium from the electrolytic solution, the first medium being configured to dissipate during discharge of the battery enough to expose one or more of the protected regions of the second medium to the electrolytic solution.

3. The battery of claim **1**, wherein the first medium is positioned so as to protect at least a portion of the second medium from the electrolytic solution, the first medium being positioned such that the concentration of the second active material decreases in a direction moving away from the first medium.

4. The battery of claim **1**, wherein a protective layer is positioned so as to protect at least a portion of the second medium from the electrolytic solution, the protective layer excluding an active material.

5. The battery of claim **1**, wherein a chemical composition of the first active material includes a component in common with a chemical composition of the second active material

6. The battery of claim **5**, wherein an ion of the common component is present in the electrolytic solution.

7. The battery of claim **5**, wherein the cathode excludes the common component before discharge of the battery.

8. The battery of claim **5**, wherein the first active material consists of the common component.

9. The battery of claim **8**, wherein the common component is lithium.

10. The battery of claim **1**, wherein the first active material and the second active material are selected such that the second active material can be generated by exposing the first active material and a second active material precursor to an electrolytic solution.

11. The battery of claim **1**, wherein the first active material includes lithium and the second active material includes lithium, silicon, and oxygen.

12. The battery of claim **1**, wherein the cathode includes one or more components selected from the group consisting of $CF_x$, $MnO_2$, silver vanadium oxide (SVO), $SOCl_2$ and $SO_2Cl_2$.

13. The battery of claim **1**, wherein the cathode includes $CF_x$.

14. The battery of claim **1**, wherein the electrolytic solution includes one or more components serving as a secondary reactant in a secondary reaction including as a reactant the secondary reactant and a product of one or more primary reactions, the one or more primary reactions occur at an electrode during discharge of the battery prior to the secondary reaction.

15. The battery of claim **14**, wherein the electrolytic solution includes one or more components selected from the group consisting of lithium bis(oxalato)borate, lithium cyclopentadiene, lithium tetramethylcyclopentadiene, vinyl sulfolane, and carbon disulfide.

16. The battery of claim **14**, wherein the electrolytic solution includes lithium bis(oxalato)borate.

17. The battery of claim **14**, wherein the anode, cathode and electrolytic solution are selected to produce a voltage discharge profile having a capacity approximation section with a slope in a range of -3.0%/% to –0.3%/% for a depth of discharge duration of at least 15%.

18. The battery of claim **14**, wherein the anode, cathode and electrolytic solution are selected to

produce a voltage discharge profile having a plateau before the capacity approximation section, the plateau having a slope in a range of -0.3%/% to 0.3%/% for a depth of discharge duration of at least 15%.

19. A primary battery, comprising:

a cathode;

an anode having a first medium including first active material and a second medium including a second active material, a chemical composition of the first active material having a component in common with a chemical composition of the second active material; and

an electrolytic solution in contact with the anode and the cathode.

20. The battery of claim **19**, wherein the first active material is present in an amount that would cause the first active material to be depleted if the first active material were the only active material in the battery.

21. The battery of claim **19**, wherein an ion of the common component is present in the electrolytic solution.

22. The battery of claim **19**, wherein the first active material and the second active material are selected such that the second active material can be generated by exposing the first active material and a second active material precursor to an electrolytic solution.

23. The battery of claim **19**, wherein the first active material consists of the common component.

24. The battery of claim **19**, wherein the second active material includes at least one component selected from the group consisting of Li, Si, SiO, Sn, SnO, Sb, Cd, Mg, Ni, Ge, Al, Cu, and Mn.

25. The battery of claim **19**, wherein the first active material includes lithium and the second active material includes lithium, silicon, and oxygen.

26. The battery of claim **19**, wherein the cathode excludes the common component before discharge of the battery.

27. The battery of claim **19**, wherein the cathode includes one or more components selected from the group consisting of $CF_x$, $MnO_2$, silver vanadium oxide (SVO), $SOCl_2$, and $SO_2Cl_2$.

28. The battery of claim **19**, wherein the cathode includes $CF_x$.

29. The battery of claim **19**, wherein the electrolytic solution includes one or more components serving as a secondary reactant in a secondary reaction including as a reactant the secondary reactant and a product of one or more primary reactions, the one or more primary reactions occur at an electrode during discharge of the battery prior to the secondary reaction.

30. The battery of claim **29**, wherein the electrolytic solution includes one or more components selected from the group consisting of lithium bis(oxalato)borate, lithium cyclopentadiene, lithium tetramethylcyclopentadiene, vinyl sulfolane, and carbon disulfide.

31. The battery of claim **29**, wherein the electrolytic solution includes lithium bis(oxalato)borate.

32. The battery of claim **19**, wherein the anode, cathode and electrolytic solution are selected to produce a voltage discharge profile having a capacity approximation section with a slope in a range of –3.0%/% to –0.3%/% for a depth of discharge duration of at least 15%.

33. The battery of claim **19**, wherein the anode, cathode and electrolytic solution are selected to produce a voltage discharge profile having a plateau before the capacity approximation section, the plateau having a slope in a range of -0.3%/% to 0.3%/% for a depth of discharge duration of at least 15%.

34. A primary battery, comprising:

an electrolytic solution contacting a cathode and an anode, the electrolytic solution, the anode and cathode selected to produce a voltage discharge profile with a capacity approximation section (CAS) having a slope continuously in a range of –3.0%/% to

-0.3%/% for a depth of discharge duration of at least 15%, wherein said CAS is immediately preceded by a plateau with a slope continuously in a range of -0.3%/% to 0.3%/% for a discharge duration of at least 15%.

35. The battery of claim **34**, wherein the anode includes a first active material and a second active material.

36. The battery of claim **34**, wherein a chemical composition of the first active material and a chemical composition of the second active material include at least one common component.

37. The battery of claim **34**, wherein the anode includes a first medium having a first active material and a second medium having a second active material.

38. The battery of claim **34**, wherein the plateau has a slope that is continuously in a range of -0.3%/% to 0.3%/% for a discharge duration of at least 50%.

39. The battery of claim **34**, wherein the capacity approximation section has a slope that is continuously in a range of -2.5%/% to –0.3%/% for a discharge duration of at least 15%.

40. The battery of claim **34**, wherein the voltage discharge profile does not exhibit an inflection point before dropping off at end-of-life.

41. A primary battery, comprising:

an electrolytic solution contacting a cathode and an anode having a first medium including a first active material and a second medium having a second active material, the electrolytic solution, the anode and cathode are selected to produce a voltage discharge profile with a capacity approximation section (CAS) having a slope continuously in a range of -3.0%/% to –0.3%/% for a discharge duration of at least 15%.

42. The battery of claim **41**, wherein the capacity approximation section has a slope continuously in a range of –2.5%/% to –0.3%/%for a discharge duration of at least 15%.

43. The battery of claim **41**, wherein the capacity approximation section has a slope continuously in a range of –3.0%/% to –0.3%/% for a discharge duration of at least 20%.

44. The battery of claim **41**, wherein the capacity approximation section has a slope continuously in a range of -2.5%/% to –0.3%/% for a discharge duration of at least 20%.

45. The battery of claim **41**, wherein a chemical composition of the first active material and a chemical composition of the second active material include at least one common component.

46. The battery of claim **41**, wherein the voltage discharge profile has a plateau preceding said CAS with a slope continuously in a range of -0.3%/% to 0.3%/%for a discharge duration of at least 15%.

47. The battery of claim **41**, wherein the voltage discharge profile has a plateau preceding said CAS with a slope continuously in a range of -0.3%/% to 0.3%/% for a discharge duration of at least 50%.

48. A method of forming a primary battery, comprising:

providing a cathode;

providing an anode having a first medium including a first active material and a second medium, the second medium having a concentration gradient of a second active material; and

activating the anode and the cathode with an electrolytic solution.

49. The method of claim **48**, wherein providing the anode includes forming the anode such that the first medium is positioned so as to protect at least a portion of the second medium from the electrolytic solution, the first medium being configured to dissipate during discharge of the battery enough to expose one or more of the protected regions of the second medium to the electrolytic solution.

50. The method of claim **48**, wherein providing the anode includes forming the anode such that the concentration of the second active material decreases in a direction moving away from

the first medium.

51. The method of claim **48**, further comprising:

generating the second active material by exposing the first active material and a second active material precursor to an electrolytic solution.

52. The method of claim **48**, wherein a chemical composition of the first active material includes a component in common with a chemical composition of the second active material

53. The method of claim **52**, wherein the common component is lithium.

54. The method of claim **48**, wherein the second active material includes at least one component selected from the group consisting of Si, SiO, Sn, SnO, Sb, Cd, Mg, Ni, Ge, Al, Cu, and Mn.

55. The method of claim **48**, wherein the first active material includes lithium and the second active material includes lithium, silicon and oxygen.

56. The method of claim **48**, wherein the electrolytic solution includes one or more components serving as a secondary reactant in a secondary reaction including as a reactant secondary reactant and a product of one or more primary reactions, the one or more primary reactions occur at an electrode during discharge of the battery prior to the secondary reaction.

57. The method of claim **48**, wherein the electrolytic solution includes lithium bis(oxalato)borate.

58. A method of forming a primary battery, comprising:

providing a cathode;

providing an anode including a first active material and second active material, a chemical composition of the first active material and a chemical composition of the second active material having a common component; and

activating the anode and the cathode with an electrolytic solution.

59. The method of claim **58**, wherein an ion of the common component is present in the electrolytic solution.

60. The method of claim **58**, further comprising:

generating the second active material by exposing the first active material and a second active material precursor to an electrolytic solution.

61. The method of claim **58**, wherein the common component intercalates from the first active material into the second active material precursor during generation of the second active material.

62. The method of claim **58**, wherein the common component is lithium.

63. The method of claim **58**, wherein the second active material includes at least one component selected from the group consisting of Si, SiO, Sn, SnO, Sb, Cd, Mg, Ni, Ge, Al, Cu, and Mn.

64. The method of claim **58**, wherein the first active material includes lithium and the second active material includes lithium, silicon and oxygen.

65. The method of claim **58**, wherein the electrolytic solution includes one or more components serving as a secondary reactant in a secondary reaction including as a reactant the secondary reactant and a product of one or more primary reactions, the one or more primary reactions occur at an electrode during discharge of the battery prior to the secondary reaction.

66. The method of claim **58**, wherein the electrolytic solution includes lithium bis(oxalato)borate.

67. A method of forming a primary battery, comprising:

forming an anode precursor having a first active material precursor short circuited with a second active material precursor; and

converting the second active material precursor to a second active material having a chemical composition with at least one component in common with the chemical

composition of the first active material precursor.

68. The method of claim **67**, wherein converting the second active material precursor to a second active material includes reacting the first active material precursor with the second active material precursor so as to generate the second active material.

69. The method of claim **68**, wherein reacting the first active material precursor with the second active material precursor includes exposing the first active material precursor and the second active material precursor to an electrolytic solution.

70. The method of claim **69**, wherein the electrolytic solution includes an ion of the common component.

71. The method of claim **67**, further comprising:
positioning the anode precursor in a battery casing before converting the second active material precursor to the second active material.

72. The method of claim **67**, wherein converting the second active material precursor to the second active material reduces the quantity of the first active material precursor without changing the chemical composition of the first active material precursor.

73. The method of claim **67**, wherein the electrolytic solution includes one or more components serving as a secondary reactant in a secondary reaction including as a reactant the secondary reactant and a product of one or more primary reactions, the one or more primary reactions occur at an electrode during discharge of the battery prior to the secondary reaction.